



Elementary STEM Centric Planning Guide



Title: Trash in Our Waterways	Teacher:
Overview: STEM Proficient students will engage in logical reasoning to answer complex questions, to investigate global issues, and to develop solutions for challenges, and real world problems.	Grade: 2
STEM Standards of Practices: Engage in <u>meaningful, purposeful and relevant</u> STEM activities using the Stem Standards of Practice Frameworks; student skills and knowledge indicators, instructional examples, resources and glossary.	
<p><i>STEM proficient students will be able to apply all seven Standards of Practice when demonstrating how to answer complex questions, to investigate global issues, and to develop solutions for challenges and real world problems.</i></p>	
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p style="text-align: center;">STEM Standards of Practice</p> <ul style="list-style-type: none"> ■ STEM Content ■ Integrate STEM ■ Communicate STEM ■ Inquiry STEM ■ Logical Reasoning STEM ■ Collaboration STEM ■ Technology STEM </div> <div style="flex: 1; padding-left: 20px;"> <p><u>Real World Problem-</u></p> <p>Trash is a human-created problem that is polluting waterways around the world. What can you as a second grader do to reduce the amount of trash that makes its way into the water and have a positive impact on the environment?</p> <p><u>Product/Prototype/Process-</u></p> <p>Create a physical model that reduces trash and helps the environment in some way.</p> </div> </div>	

Content Standards

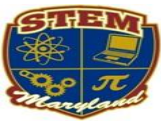
<u>Science</u>	<u>Technology</u>	<u>Engineering Design Process</u>	<u>CCSS Mathematics/Practices</u>	<u>CCSS ELA</u>	<u>Social Studies</u>	<u>Fine Arts</u>
Environmental Literacy Standards: 2.B.1.1 2.B.1.2 MDSC Science Standard: 6.B.1.a	Research Resources	Design Construct Build Test Modify a product/prototype/process	Measurement MD.2.10 Represent and Interpret Data – collect, organize & display data about the types of trash thrown away in homes and classrooms Standards of Mathematical Practice: Persevering	RI.2.9 Read for information about Kenya. Select one: W.2.1 Write to persuade others to reduce, refuse, reuse and/or recycle. W.2.2 Write to inform individuals and families of	Geography Citizenship Economics (Location of and environmental leadership demonstrated by Unique Eco in Kenya, Africa and the economic impact.)	Aesthetic appeal Materials for construction Artistic expression



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			through problem solving	the benefits of reducing, refusing, reusing and/or recycling.		
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Transdisciplinary Connections:

Using a photo essay, students will identify the problem (trash in waterways) and then research to find out why the trash problem exists and what others around the world are doing to solve the trash problem. Students will read a number of different print and digital resources to expand their understanding of the problem, its impact, and what is already being done to address the problem. Students will develop and implement a personal action plan to solve the trash problem. As part of their action plan, students will create a physical model of their product/process/prototype that helps the environment and reduces, reuses, refuse, and/or recycles trash. Example: milk jug flower pot, orange juice carton wallet, recycled plastic container bird houses and bird feeders, recycled art sculptures, and old jeans grocery bags. Students will share their solution and what they have learned with their class and school peers and local community as appropriate.

Connection to STEM Careers:

Environmental Impact Specialists
Community Outreach Specialists
Chemists
Waste Management
Recycling Artists
Resource Recovery
Environmental Sciences
Statisticians
Oceanographers
Civil Engineers
Mechanical Engineers
Chemical Engineers

Enduring Understanding:

Trash is a human-created problem that is polluting waterways around the world. As such, it is up to us as humans to solve the trash problem that we have created.

The actions we take have consequences, both positive and negative.

There are many times when we have to solve problems created by others.

Essential Questions:

How does trash impact our waterways?

What is the impact of human-made trash on wildlife?

What is our role as citizens of Earth in protecting the environment?

Why is it important to continue to look at the trash problem over time?

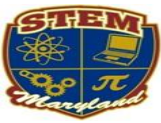
How do our actions impact the world around us?



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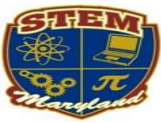
Lesson Procedures	Suggested Activities	STEM Standards of Practice
<p>5E Components</p> <p>The 5E model is cyclical, not linear and components may be repeated or revisited over the course of the lesson. A 5 E model lesson may last longer than 1 period or block of time.</p> <p>* Evaluation of student's learning occurs throughout the 5 E model. Evaluations may include student self-evaluation, peer group evaluation, and/or teacher monitoring student's progress.</p>		<input type="checkbox"/> STEM Content <input type="checkbox"/> Integrate STEM <input type="checkbox"/> Communicate STEM <input type="checkbox"/> Inquiry STEM <input type="checkbox"/> Logical Reasoning STEM <input type="checkbox"/> Collaboration STEM <input type="checkbox"/> Technology STEM
<p>Engagements (Repeated process)</p> <p>Did you design an activity that...</p> <p><input type="checkbox"/> captures students' attention?</p> <p><input type="checkbox"/> activates students' prior knowledge?</p> <p><input type="checkbox"/> connects to a complex question, global issue, or real world problem?</p>	<p>Show the "Trash in our Waterways" photo essay. Have students identify the problem. Have students identify the different types of trash seen in the photo essay.</p> <p>Pose "Essential Questions".</p> <p>Pose additional questions such as, "Who caused this mess? What can be done about the mess? Is this problem and individual, local, national or global one?"</p>	<input type="checkbox"/> STEM Content <input type="checkbox"/> Integrate STEM <input type="checkbox"/> Communicate STEM <input type="checkbox"/> Inquiry STEM <input type="checkbox"/> Logical Reasoning STEM <input type="checkbox"/> Collaboration STEM <input type="checkbox"/> Technology STEM
<p>Explorations</p> <p>Did you design an activity that allows students to...</p> <p><input type="checkbox"/> analyze the science, technology, engineering, mathematics, and other disciplines as appropriate in a complex question, global issue, or real world problem?</p> <p><input type="checkbox"/> apply the engineering design process, scientific investigation, and/or mathematical practices?</p> <p><input type="checkbox"/> select and employ technological tools that are relevant to answering a complex question, investigating a global issue, or developing solutions to a real world problem?</p>	<p>Have students explore different trash items such as: plastic grocery store bags, empty soda pop cans, empty orange juice cartons, empty plastic milk jugs, discarded newspapers and classroom papers, empty glass bottles. Have students work in collaborative groups to sort the trash items. Students share how they sorted the items and why. Ask students how they think the trash ended up on the beaches and in the waterways.</p> <p>Allow students to brainstorm possible solutions to the trash problem as individuals and groups. Allow them to bring in recycled materials to reuse during the construction of their physical models.</p> <p>Students gather, record, display and interpret data related to the trash their family, classroom and school throws away, recycles, and reuses.</p> <p>Students explore STEM related jobs that address the trash problem.</p> <p>Students compare the Engineering Design Process from Engineering is Elementary, the Scientific Process and the</p>	<input type="checkbox"/> STEM Content <input type="checkbox"/> Integrate STEM <input type="checkbox"/> Communicate STEM <input type="checkbox"/> Inquiry STEM <input type="checkbox"/> Logical Reasoning STEM <input type="checkbox"/> Collaboration STEM <input type="checkbox"/> Technology STEM



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	Creative Problem Solving Process. Discuss why different processes exist, how they are all similar and when and why one process may work better than others.	
<p>Explanations</p> <p>Did you design an activity that allows students to...</p> <p><input type="checkbox"/> analyze information, data and draw conclusions?</p> <p><input type="checkbox"/> communicate understandings and possible solutions?</p>	<p>Address science and social studies concepts related to water movement, landforms and water systems including street drainage to streams, rivers, the Chesapeake Bay and oceans.</p> <p>Address the social studies concept of citizenship, rights, rules, and responsibilities.</p> <p>Research waste management and local and national recycling projects such as: Disney's Friends for Change, Nickelodeon's Big Help, PBK Kids.</p> <p>Discuss STEM related jobs and the character traits demonstrated by leaders in those jobs such as: leadership, resourcefulness, perceptiveness, inquisitiveness, persistence, being communicative.</p> <p>Guest Speaker(s) from school system plant facilities and local waste management facilities share their job, the role their place of employment plays for in the community, etc.</p>	<input type="checkbox"/> STEM Content <input type="checkbox"/> Integrate STEM <input type="checkbox"/> Communicate STEM <input type="checkbox"/> Inquiry STEM <input type="checkbox"/> Logical Reasoning STEM <input type="checkbox"/> Collaboration STEM <input type="checkbox"/> Technology STEM
<p>Extensions / Elaborations</p> <p>Did you design an activity that allows students to;</p> <p><input type="checkbox"/> modify experimental procedures, prototypes, models, or solutions?</p> <p><input type="checkbox"/> analyze STEM careers that relate to the learning activity?</p>	<p>Research Unique Eco in Kenya to find out how they are working to solve the problem of flip flops in the waterways and on the beaches. http://www.journeyman.tv/?lid=12179</p> <p>http://multimedia.timeslive.co.za/videos/2010/08/flip-flop-art-creates-jobs-in-kenya/</p> <p>http://www.swahili-imports.com/home/si3/page_5146/uniqueco_the_flip_flop_project.html</p>	<input type="checkbox"/> STEM Content <input type="checkbox"/> Integrate STEM <input type="checkbox"/> Communicate STEM <input type="checkbox"/> Inquiry STEM <input type="checkbox"/> Logical Reasoning STEM <input type="checkbox"/> Collaboration STEM



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	<p>Students continue to work on and test their physical model.</p> <p>Students revisit their action plans and make adjustments/revisions based on their progress so far.</p> <p>Students create posters and announcements to educate grade and school peers on the importance of reducing, reusing, refusing, and recycling.</p>	<input type="checkbox"/> Technology STEM
<p>Evaluations</p> <p>Did you design an activity that allows students to...</p> <p><input type="checkbox"/> demonstrate understanding of concepts through rubric-based performance assessments?</p> <p><input type="checkbox"/> participate in peer reviews?</p>	<p>Students select one: Write to persuade others to reduce, refuse, reuse and/or recycle. OR Write to inform individuals and families of the benefits of reducing, refusing, reusing and/or recycling.</p> <p>Students publish their action plan and share their physical model.</p> <p>Students select and defend the process (Engineering Design Process, Scientific Process, Creative Problem Solving Process) they feel works best for this unit.</p>	<input type="checkbox"/> STEM Content <input type="checkbox"/> Integrate STEM <input type="checkbox"/> Communicate STEM <input type="checkbox"/> Inquiry STEM <input type="checkbox"/> Logical Reasoning STEM <input type="checkbox"/> Collaboration STEM <input type="checkbox"/> Technology STEM